AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of claims

1. (Currently Amended) A method for stabilizing a gain of a gamma-ray detector for use in a downhole logging tool, wherein the method comprises the steps of:

~~being based on a~~ processing ~~of~~ a backscatter peak of a full gamma spectrum such that the backscatter peak constitutes a reference peak;

determining a first rate, the first rate corresponding to gamma-rays having an energy within a first predetermined energy interval;

determining a second rate, the second rate corresponding to gamma-rays having an energy within a second predetermined energy interval; and

wherein the first predetermined energy interval and the second predetermined energy interval straddle the backscatter peak.

2. (Cancelled) ~~The method of claim 1, the method further comprising:~~

~~determining a first rate, the first rate corresponding to gamma-rays having an energy within a first predetermined energy interval;~~

~~determining a second rate, the second rate corresponding to gamma-rays having an energy within a second predetermined energy interval,~~

~~wherein the first predetermined energy interval and the second predetermined energy interval straddle the backscatter peak.~~

3. (Currently Amended) The method of claim ~~2~~1, the method further comprising:

adjusting the gain such that a ratio of the first rate and the second rate substantially equals a predetermined value.

4. (Currently Amended) The method of claim ~~2~~1, the method further comprising adjusting the gain such that a difference of the first rate and the second rate multiplied by a predetermined positive coefficient substantially equals zero.

5. (Original) The method of claim 1, the method further comprising:

measuring a centroid position of a detected backscatter peak;

adjusting the gain such that the measured centroid position equals a reference centroid position.

6. (Original) The method according to claim 1, wherein the detector is intended to detect natural gamma-rays from a formation surrounding a borehole.

7. (Original) The method according to claim 6, wherein a gamma-ray inducing source is located in a neighborhood of the gamma-ray detector.

8. (Original) The method according to claim 1, wherein the detector is intended to detect neutron-induced gamma-rays.

9. (Currently Amended) A system for stabilizing a gain of a gamma-ray detector for use in a downhole logging tool, the system comprising:

the gamma-ray detector to detect gamma-rays;

discriminating means allowing to compare the energy of the detected gamma-rays to at least three regulation thresholds, the three regulation thresholds being located in an energy neighborhood of a backscatter peak of a full gamma spectrum~~;~~, the backscatter peak constituting a reference peak, the discriminating means determining a first rate and a second rate, the first rate and the second rate corresponding to gamma-rays having an energy respectively within a first predetermined energy interval and a second predetermined energy interval, the first predetermined energy interval and the second predetermined energy interval straddling the backscatter peak; and

adjusting means to adjust the gain of the gamma-ray detector.

10. (Cancelled) ~~The system of claim 9, wherein the discriminating means allowing to determine a first rate and a second rate, the first rate and the second rate corresponding to gamma-rays having an energy respectively within a first predetermined energy interval and a second predetermined energy interval, the first predetermined energy interval and the second predetermined energy interval straddling the backscatter peak.~~

11. (Currently Amended) The system of claim ~~10~~9, further comprising:

calculating means to calculate a ratio of the first rate and the second rate and to compare the ratio to a predetermined value.

12. (Currently Amended) The system of claim 9, wherein:

the discriminating means allowing to compare the energy of the detected gamma-rays to a relatively high number of regulation thresholds so as to obtain a complete spectrum;

the system further comprises calculating means to calculate a centroid position of a detected backscatter peak of the complete spectrum and to compare the calculated centroid position to a reference centroid position.

13. (Original) The system of claim 9, wherein

the gamma-ray detector is located in a drilling tool;

the gamma-ray detector is intended to detect natural gamma-rays from a formation surrounding a drilled borehole.

14. (Currently Amended) A method for evaluating a natural gamma-ray activity within a borehole, the method comprising:

stabilizing a gain of a gamma-ray detector by processing a backscatter peak of a full gamma spectrum such that the backscatter peak constitutes a reference peak by:

determining a first rate, the first rate corresponding to gamma-rays having an energy within a first predetermined energy interval, determining a second rate, the second rate corresponding to gamma-rays having an energy within a second predetermined energy interval, the first predetermined energy interval and the second predetermined energy interval straddling the backscatter peak; and

adjusting the gain to such that a value of a ratio of the first rate and the second rate substantially equals a predetermined value;

determining an interval count rate, the interval count rate corresponding to gamma-rays having an energy within a predetermined correction interval;

calculating a correction count rate from the determined interval count rate; and

using the correction count rate to evaluate the natural gamma-ray activity.

15. (Original) The method according to claim 14, wherein the predetermined correction interval is semi infinite above a predetermined correction threshold.

16. (Currently Amended) The method according to claim 15, further comprising:

measuring a total gamma count rate, the total gamma count rate corresponding to gamma-rays detected by the gamma-ray detector;

subtracting the correction count rate from the total gamma count rate to evaluate the natural gamma-ray activity.

17. (Original) The method according to claim 16, wherein the correction count rate is proportional to the determined interval count rate.

18. (Original) The method according to claim 14, wherein

a gamma-ray inducing source is located downhole in a neighborhood of the system; and

the gamma-ray inducing source is an high energy neutron generator.

19. (Original) The method according to claim 18, wherein the evaluating of the natural gamma-ray activity is performed during a drilling of the borehole.

20. (Original) The method according to claim 19, wherein the neutron-induced gamma-rays are due to an activation of oxygen atoms located within a drilling mud.

21. (Cancelled) ~~The method according to claim 14, further comprising stabilizing a gain of the gamma-ray detector.~~

22. (Cancelled) ~~The method according to claim 21, further comprising :~~

~~determining a first rate, the first rate corresponding to gamma-rays having an energy within a first predetermined energy interval;~~

~~determining a second rate, the second rate corresponding to gamma-rays having an energy within a second predetermined energy interval;~~

~~adjusting the gain to such that a value of a ratio of the first rate and the second rate substantially equals a predetermined value.~~

23. (Cancelled) ~~The method of claim 22, wherein the first predetermined energy interval and the second predetermined energy interval straddle a backscatter peak of a full gamma spectrum.~~

24. (Cancelled) ~~The method according to claim 21, further comprising:~~

~~generating calibration gamma-rays, the energy of the calibration gamma-rays being substantially equal to a well defined energy value;~~

~~using the calibration gamma-rays to stabilize the gain of the gamma-ray detector.~~

25. (Currently Amended) A system for evaluating a natural gamma-ray activity within a borehole, the system comprising:

a gamma-ray detector located downhole to detect gamma-rays;

at least one discriminator to allow to determine an interval count rate, the interval count rate corresponding to gamma-rays having an energy within a predetermined correction interval, the at least one discriminator allowing to determine and compare a first rate and a second rate, the first rate and the second rate corresponding to gamma-rays having an energy respectively within a first predetermined energy interval and a second predetermined energy interval, the first predetermined energy interval and the second predetermined energy interval straddling a backscatter peak of a full gamma spectrum, the backscatter peak constituting a reference peak;

adjusting means to adjust a gain of the gamma-ray detector according to a result of the comparing;

calculating means to calculate a ratio of the first rate and the second rate and to compare the ratio to a predetermined value; and

processing means to calculate a correction count rate from the determined interval count rate, the correction count rate being used to evaluate the natural gamma-ray activity.

26. (Original) The system according to claim 25, wherein the predetermined correction interval is semi infinite above a predetermined correction threshold.

27. (Cancelled) ~~The system according to claim 26,~~

~~wherein the at least one discriminator allows to determine a first rate and a second rate, the first rate and the second rate corresponding to gamma-rays having an energy respectively within a first predetermined energy interval and a second predetermined energy interval; the system further comprising~~

~~calculating means to calculate a ratio of the first rate and the second rate and to compare the ratio to a predetermined value; and~~

~~adjusting means to adjust a gain of the gamma-ray detector according to a result of the comparing.~~

28. (Original) The system according to claim 25, wherein

a gamma-ray inducing source is located downhole near the system;

the gamma-ray inducing source is an high energy neutron generator.

29. (Original) The system according to claim 28, wherein the detector is located in a drilling tool.

30. (Original) The system according to claim 29, wherein the detector detects neutron-induced gamma-rays, the neutron-induced gamma-rays being due to an activation of oxygen atoms located in a drilling mud by high energy neutrons.

31. (Original) The system according to claims 25, further comprising:

a shield located at a rear side of a crystal of the gamma-ray detector to reduce the detecting of gamma-rays coming from the rear side.

32. (Original) The system according to claims 31, further comprising a collar surrounding the crystal, the collar having a recess on a front side of the crystal to improve a transmission of gamma-rays coming from the front side.